DRAFT NOISE STUDY

for the

BARRIO LOGAN COMMUNITY PLAN UPDATE

CITY OF SAN DIEGO

Prepared for:

MIG, Inc.

169 N. Marengo Avenue

Pasadena, CA 91101-1703

Prepared by:

DUDEK

605 Third Street

Encinitas, California 92024

DECEMBER 2008

TABLE OF CONTENTS

Section **Page No.**

ATTACHMENTS

TABLE OF CONTENTS

Section **Page No.**

LIST OF FIGURES

LIST OF TABLES

1.0 BACKGROUND

1.1 Introduction

As part of the Barrio Logan Community Plan Update, this study has been prepared the City has to conduct noise measurements and develop the noise contour mapping that addresses existing and future noise levels in the Barrio Logan Community Plan area. The Barrio Logan community is located south of downtown San Diego as shown in *Figure 1*.

The noise study focuses on transportation corridors and stationary noise sources. Noise measurements along major roadways, the railroad, and significant stationary noise sources were conducted. The study provides figures illustrating existing and future noise levels for the community resulting from transportation or other major noise sources.

1.2 Noise Fundamentals

The following is a brief discussion of fundamental noise concepts.

Sound, Noise, and Acoustics

Sound is a disturbance created by a moving or vibrating source in a gaseous or liquid medium or the elastic stage of a solid, and is capable of being detected by the hearing organs. Sound may be thought of as the mechanical energy of a vibrating object transmitted by pressure waves through a medium to a hearing organ, such as a human ear. For traffic sound, the medium is air.

Sound is actually a process that consists of three components: the sound source, the sound path, and the sound receiver. All three components must be present for sound to exist. Without a source to produce sound, there is no sound. Likewise, without a medium to transmit sound pressure waves, there is no sound. Finally, sound must be received; a hearing organ, sensor, or object must be present to perceive, register, or be affected by, sound or noise. In most situations, there are many different sound sources, paths, and receptors rather than just one of each. Acoustics is the field of science that deals with the production, propagation, reception, effects, and control of sound. Noise is defined as sound that is loud, unpleasant, unexpected, or undesired.

Figure 1 Project Vicinity

Frequency and Hertz

A continuous sound can be described by its frequency (pitch) and its amplitude (loudness). Frequency relates to the number of pressure oscillations per second. Low-frequency sounds are low in pitch, like the low notes on a piano, whereas high-frequency sounds are high in pitch, like the high notes on a piano. Frequency is expressed in terms of oscillations, or cycles, per second. Cycles per second are commonly referred to as Hertz (Hz). A frequency of 250 cycles per second is referred to as *250* Hz. High frequencies are sometimes more conveniently expressed in units of kilo-Hertz (kHz), or thousands of Hertz. The extreme range of frequencies that can be heard by the healthiest human ear spans from 16 - 20 Hz on the low end to about 20,000 Hz (or 20 kHz) on the high end.

Sound Pressure Levels and Decibels

The amplitude of a sound determines its loudness. Loudness of sound increases and decreases with its amplitude. Sound pressure amplitude is measured in units of micro-Newton per square meter (N/rn^2), also called micro-Pascal (µPa). One µPa is approximately one-hundred billionth (0.00000000001) of normal atmospheric pressure. The pressure of a very loud sound may be 200 million µPa, or 10 million times the pressure of the weakest audible sound (20 µPa). Because expressing sound levels in terms of µPa would be very cumbersome, sound pressure level in logarithmic units is used instead to describe the ratio of actual sound pressures to a reference pressure squared. These units are called Bels, named after Alexander Graham Bell. To provide a finer resolution, a Bel is subdivided into 10 decibels, abbreviated dB.

A-Weighted Decibels

Sound pressure level alone is not a reliable indicator of loudness. The frequency, or pitch, of a sound also has a substantial effect on how humans will respond. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human ear.

Human hearing is limited not only in the range of audible frequencies but also in the way it perceives the sound in that range. In general, the healthy human ear is most sensitive to sounds between 1,000 Hz and 5,000 Hz, and it perceives a sound within that range as more intense than a sound of higher or lower frequency with the same magnitude. To approximate the frequency response of the human ear, a series of sound level adjustments is usually applied to the sound measured by a sound level meter. The adjustments (referred to as a weighting network) are frequency-dependent.

The A-scale weighting network approximates the frequency response of the average healthy ear when listening to most ordinary sounds. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-scale sound levels of those sounds. Other weighting networks have been devised to address high noise levels or other special situations (e.g., B-scale, C-scale, D-scale), but these scales are rarely, if ever, used in conjunction with highway traffic noise. Noise levels for traffic noise reports are typically reported in terms of A-weighted decibels (dBA). All sound levels discussed in this report are A-weighted. Examples of typical noise levels for common indoor and outdoor activities are depicted in *Table 1*. The basic terminology and concepts of noise are described below, with technical terms defined in *Attachment A.*

Addition of Decibels

Because decibels are logarithmic units, sound pressure levels cannot be added or subtracted by ordinary arithmetic means. For example, if one automobile produces a sound level of 70 dBA when it passes an observer, two cars passing simultaneously would not produce 140 dBA; they would, in fact, combine to produce 73 dBA. When two sounds of equal sound level are combined, they will produce a combined sound level three dBA greater than the original individual sound level. In other words, sound energy must be doubled to produce a three dBA increase. If two sound levels differ by 10 dBA or more, the combined sound level is equal to the higher sound level; in other words, the lower sound level does not increase the higher sound level.

Human Response to Changes in Noise Levels

Under controlled conditions in an acoustics laboratory, the trained, healthy human ear is able to discern changes in sound levels of one dBA when exposed to steady, single-frequency signals in the mid-frequency range. Outside such controlled conditions, the trained ear can detect changes of two dBA in normal environmental noise. It is widely accepted that the average healthy ear, however, can barely perceive noise level changes of three dBA. A change of five dBA is readily perceptible, and a change of 10 dBA is perceived as twice or half as loud. As discussed above, a doubling of sound energy results in a three dBA increase in sound, which means that a doubling of sound energy (e.g., doubling the volume of traffic on a highway) would result in a barely perceptible change in sound level.

TABLE 1
Typical Sound Levels in the Environment and Industry

Common Outdoor Activities	Noise Level (dBA)	Common Indoor Activities
	110	Rock Band
Jet Fly-over at 300 m (1000 ft)	100	
Gas Lawn Mower at 1 m (3 ft)	90	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	80	Food Blender at 1 m (3 ft) Garbage Disposal at 1 m (3 ft)
Noisy Urban Area, Daytime Gas Lawn Mower at 30 m (100 ft)	70	Vacuum Cleaner at 3 m (10 ft)
Commercial Area Heavy Traffic at 90 m (300 ft)	60	Normal Speech at 1 m (3 ft)
Quite Urban Daytime	50	Large Business Office Dishwasher Next Room
Quite Urban Nighttime	40	Theater, Large Conference Room (Background)
Quite Suburban Nighttime	30	Library
Quite Rural Nighttime	20	Bedroom at Night, Concert Hall (Background)
	10	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	0	Lowest Threshold of Human Hearing

Source: Caltrans 1998

Noise Descriptors

Leq: Additional units of measure have also been developed to evaluate the long-term characteristics of sound. The equivalent sound level (L_{eq}), is also referred to as the time-average sound level. It is the equivalent steady state sound level which in a stated period of time would contain the same acoustical energy as the time-varying sound level during the same time period. The one-hour A-weighted equivalent sound level, L_{eq}(h), is the energy average of the A-weighted sound levels occurring during a one-hour period.

CNEL: People are generally more sensitive and annoyed by noise occurring during the evening and nighttime hours. Thus, another noise descriptor used in community noise assessments termed the Community Noise Equivalent Level (CNEL) was introduced. The CNEL scale represents a time-weighted 24-hour average noise level based on the A-weighted sound level. CNEL accounts for the increased noise sensitivity during the evening (7:00 p.m. to 10:00 p.m.) and nighttime hours (10:00 p.m. to 7:00 a.m.) by adding five and ten decibels, respectively, to the average sound levels occurring during these hours.

Sound Propagation

Sound propagation (i.e., the passage of sound from a noise source to a receiver) is influenced by several factors. These factors include geometric spreading, ground absorption and atmospheric effects, as well as shielding by natural and/or manmade features, as described below.

Geometric spreading: Sound from a small, localized source (i.e., a point source) radiates uniformly outward as it travels away from the source in a spherical pattern. The sound level attenuates (or drops off) at a rate of six dBA for each doubling of distance. Highway noise is not a single, stationary point source of sound. The movement of the vehicles on a highway makes the source of the sound appear to emanate from a line (i.e., a line source) rather than a point. This line source results in cylindrical spreading rather than the spherical spreading that occurs from a point source. The change in sound level from a line source is three dBA per doubling of distance.

Ground absorption: Most often the noise path between the highway and the observer is very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is done for simplification only; for distances of less than 60 meters (200 feet) prediction results based on this scheme are sufficiently accurate. For acoustically hard sites (i.e., those sites with a reflective surface, such as a parking lot or a smooth body of water, between the source and the receiver), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface, such as soft dirt, grass, or scattered bushes and trees, between the source and the receiver), an excess ground attenuation value of 1.5 dBA per doubling of distance is normally assumed. When added to the geometric spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dBA per doubling of distance for a line source.

Atmospheric effects: Research by Caltrans and others has shown that atmospheric conditions can have a significant effect on noise levels. The most significant meteorological parameters are wind speed and direction, and temperature gradients. Humidity and air turbulence also can have significant effects. Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lower noise levels. Increased sound levels can also occur as a result of temperature inversion conditions (i.e., increasing temperature with elevation).

Shielding by natural or human-made features: A large object or barrier in the path between a noise source and a receiver can substantially attenuate noise levels at the receiver. The amount of attenuation provided by this shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and walls) can substantially reduce noise levels. Walls are often constructed between a source and a receiver specifically to reduce noise. A barrier that breaks the line of sight between a source and a receiver will typically result in at least five dBA of noise reduction. A taller barrier may provide as much as 20 dBA of noise reduction.

1.3 Methodology

Noise measurements were made using a RION Model NA 27 (S.N. 701307) and a Larson-Davis Laboratories Model 700 (S.N. 2132) integrating sound level meters equipped with ½-inch pre-polarized condenser microphones with pre-amplifiers. The sound level meters meet the current American National Standards Institute standard for a Type 1 precision sound level meter. The sound level meters were calibrated before and after the measurements, and the measurements were conducted with the microphones positioned approximately five feet above the ground. The noise monitoring survey and selection of receiver sites are discussed in more detail in Section 2.3 of this report.

The existing and future noise contours were calculated using the Federal Highway Administration's TNM 2.5 traffic noise model. TNM 2.5 noise model accepts as input the number and types of vehicles on the roadway, vehicle speeds, receiver locations and other input data. Traffic noise modeling noise contour data are included in *Attachment B.*

The noise levels associated with the trains along the railways were calculated based on noise measurements and using the Federal Highway Transit Administration's train noise model (FTA 2006). This train noise model calculates train noise based a various factors including train speeds, number of locomotives, the use of transit whistles, warning horns, etc. Train noise modeling contour data are included in *Attachment C*.

1.4 Applicable Noise Regulations and Standards

Various regulations, plans, and studies have been adopted by the state, the Airport Land Use Commission, the military, or the City. These documents and standards are listed in *Table 2*.

TABLE 2. Existing Regulations, Plans and Standards

Regulation	Description
Airport Noise Compatibility Planning (Code of Federal Regulations, Part 150)	Part 150 identifies compatible land uses with various levels of noise exposure to noise by individuals for local jurisdictions to use as guidelines, since the federal government does not have local land use control.
California Environmental Quality Act (CEQA)	CEQA considers exposure to excessive noise an environmental impact. Implementation of CEQA ensures that during the decision-making stage of development, City officials and the public will be informed of any potentially excessive noise levels and available mitigation measures to reduce them to acceptable levels.
California Noise Insulation Standards (California Code of Regulations, Title 24)	Title 24 establishes an interior noise standard of 45 dBA for multiple unit and hotel/motel structures. Acoustical studies must be prepared for proposed multiple unit residential and hotel/motel structures within the Community Noise Equivalent Level (CNEL) noise contours of 60 dBA or greater. The studies must demonstrate that the design of the building will reduce interior noise to 45 dBA CNEL or lower.
California Airport Noise Standards (California Code of Regulations Title 21)	Title 21 establishes that the 65 dBA CNEL is the acceptable level of aircraft noise for persons living near an airport.
Air Installations Compatible Use Zones (AICUZ) Study (US Department of Defense)	The AICUZ study establishes land use strategies and noise and safety recommendations to prevent the encroachment of incompatible land use from degrading the operational capability of military air installations.
Airport Land Use Compatibility Plans (ALUCP) (Public Utilities Code, §21670, et seq.)	The ALUCPs promote compatibility between public use and military airports and the land uses that surround them to the extent that these areas are not already devoted to incompatible land uses. The City is required to modify its land use plans and ordinances to be consistent with the ALUCPs or to take steps to overrule the Airport Land Use Commission (ALUC).
City of San Diego General Plan (Noise Element)	The purpose of the Noise Element is to protect people living and working in the City of San Diego from excessive noise. The Noise Element provides background information regarding noise, identifies noise planning goals and policies, establishes desired noise level criteria, and other related regulations and plans to implement the noise element.
The City of San Diego Noise Abatement and Control Ordinance (Municipal Code Section 59.5.0101 et seq.)	Provides controls for excessive and annoying noise from sources such as refuse vehicles, parking lot sweepers, watercraft, animals, leaf blowers, alarms, loud music, and construction activities.

Within the Barrio Logan Community, the most frequently encountered regulations are from the California Environmental Act (CEQA), California Noise Insulation Standards, City of San Diego General Plan Noise Element and City of San Diego Noise Ordinance. The Port of San Diego is subject to CEQA and to the California Noise Insulation Standards, but not the City's General Plan or noise ordinance.

2.0 EXISTING CONDITIONS

2.1 Existing Land Uses

The Barrio Logan community can generally be described as a community with residential uses interspersed within industrial and commercial areas which can create noise conflicts. Along the western portion of the community boundary are industrial shipbuilding and repair facilities located along the San Diego Harbor on Port of San Diego or Navy properties.

2.2 Sources of Noise

Noise typically is categorized as transportation-related or stationary noise. Transportation noise refers to noise from vehicles on roads, airport operations, and rail activity. Stationary noise sources include machinery, fabrication, construction, air conditioning systems, compressors, landscape maintenance equipment, and a range of activities (e.g., live music/concerts, outdoor cafes, amplified music from stereos, and loud voices of crowds).

Within the Barrio Logan community, the primary sources of noise include both transportation and stationary sources. Transportation-related sources within the community are primarily vehicular traffic along major roads, and train noise along trolley and freight lines. Stationary noise sources from industrial and commercial activities also present some concerns, particularly where such operations are adjacent to residential neighborhoods. The community is not subject to significant overflight of aircraft. Noise impacts generated by construction activities, as well as special events at schools, parks, commercial businesses and public assembly places also can periodically generate high levels of noise in the community.

Transportation-Related Noise

Barrio Logan has a number of roadways with 1,000 average daily trips or greater. There are a number of roads with vehicles traveling to, from, and through Barrio Logan daily. The most heavily traveled roadways include I-5, SR 75, Harbor Drive, Main Street, 28th Street, 32nd Street, Cesar Chavez Parkway and portions of Main Street which have segments that exceed 10,000 average daily trips.

Trucks carrying heavy loads of materials travel to and from commercial, industrial and the Port of San Diego operations within the Barrio Logan community. Truck routes have been designated by the City for use by heavy trucks to access most commercial or industrial areas and the Port of San Diego in the community to protect residences and other noise sensitive uses from excessive noise impacts. Within certain areas of the Barrio Logan community trucks comprise a high percentage of vehicular traffic along the roadways. Trucks have a greater level of noise then most other vehicles. Truck routes are designated along Harbor Drive, 28th Street and 32nd Street within the Barrio Logan community. Other roads within the community restrict trucks to no more than one-ton or five-ton depending on the road. Residential uses adjacent to I-5, SR 75, and the designated truck routes are particularly impacted by heavy truck traffic noise.

Stationary Noise Sources

Stationary noise sources that affect noise-sensitive land uses in the Barrio Logan community include manufacturing and warehousing activities, shipbuilding and repair facilities, recycling facilities, auto repair, other industrial and commercial uses and Port of San Diego related activities. Industrial and commercial impacts are generally related to noise generated by loading dock operations, trucks entering and leaving the area, mechanical equipment located outside buildings, and use of equipment inside particularly when the activity is conducted with garage doors open. Industrial and commercial uses near residential uses can cause noise impacts. Typically, these excessive industrial and commercial noises can be minimized through separation or shielding of noise sensitive uses, application of noise attenuation techniques, and the enforcement of the City's Noise Ordinance.

Community Noise

Typical community activities generate noise. Outdoor activities such as children at playgrounds or sports events, stereos, animal noise, e.g., barking dogs), emergency signaling devices (e.g., car and fire alarms, home security devices), and landscape and garden maintenance equipment all generate noise. These activities are not considered significant noise sources; while they can be objectionable, they are normally classified as nuisance noise. The City adopted the Noise Ordinance to regulate excessive community noise.

2.3 Noise Level Measurements

A community noise survey was conducted to document noise exposure at various areas within the Barrio Logan community. One long-term (*i.e.*, 24-hour) noise measurement location and 15 short-term noise measurement location were selected (*Figure 2*). The noise monitoring sites

Figure 2 Noise Measurement Locations, Existing Land Uses and Truck Routes were selected to be representative of typical conditions in the planning area and were chosen based on their proximity to noise-generating activities, proximity to noise-sensitive land uses (i.e., residences and schools), or a combination of these factors. They are representative of the noise which people experience in the vicinity of roads, rail lines and industrial/commercial areas.

Site A was located approximately 90 feet from the center line of 28th Street. The noise measurement at Site A was conducted for 24-hours beginning at 11:00 a.m. on Wednesday, June 18, 2008. The measured hourly average noise levels ranged from 57 to 68 dBA. Based on this 24-hour measurement the CNEL was 68 dBA. The primary noise source was traffic on 28th Street. The measured hourly average noise levels are depicted in *Table 3*.

TABLE 3
Existing Measured Hourly Average Noise Levels
(Site A Approximately 90 feet Centerline of 28th Street; South of Boston Avenue)

DAY	START TIME	L_{eq} (dBA)
Wednesday, 6/18/08	11:00 A.M.	65
	12:00 Noon	66
	1:00 P.M.	67
	2:00 P.M.	67
	3:00 P.M.	67
	4:00 P.M.	64
	5:00 P.M.	64
	6:00 P.M.	63
	7:00 P.M.	63
	8:00 P.M.	62
	9:00 P.M.	60
	10:00 P.M.	61
	11:00 P.M.	59
Thursday, 6/19/08	12:00 Midnight	59
	1:00 A.M.	57
	2:00 A.M.	58
	3:00 A.M.	57
	4:00 A.M.	60

TABLE 3
Existing Measured Hourly Average Noise Levels
(Site A Approximately 90 feet Centerline of 28th Street; South of Boston Avenue)

DAY	START TIME	L_{eq} (dBA)
	5:00 A.M.	63
	6:00 A.M.	63
	7:00 A.M.	64
	8:00 A.M.	68
	9:00 A.M.	64
	10:00 A.M.	67
CNEL		68

The results of the short-term noise measurements, as described in terms of the average sound level, are shown in *Table 4*. Measurements for each site were taken between June and July of 2008. When reviewing the noise data shown in *Table 4* it is important to note that most of these sites were at the front yards of homes or businesses. These data are intended to identify noise levels over a broad range of the community and are not an assessment of impacts at these sites. In most cases the major sources of noise are vehicular traffic. The majority of the daytime measured average noise levels range from 60 to 65 dBA. The loudest measured average noise level was 77 dBA adjacent to I-5 (Site 5). Across from a recycling facility the measured noise level was 71 dBA (Site 11). This noise level primarily resulted from the on-site mechanical equipment and trucks loading and unloading at the facility. As previously indicated in *Table 3*, the sound level at any location fluctuates greatly during the day. Thus, these measurements provide a transitory observation of the noise environment. The complete noise monitoring results, which include the maximum noise level, minimum noise levels and statistical descriptors (i.e., L_1, L_{10}, L_{50} and L_{90}) are included in *Attachment D.*

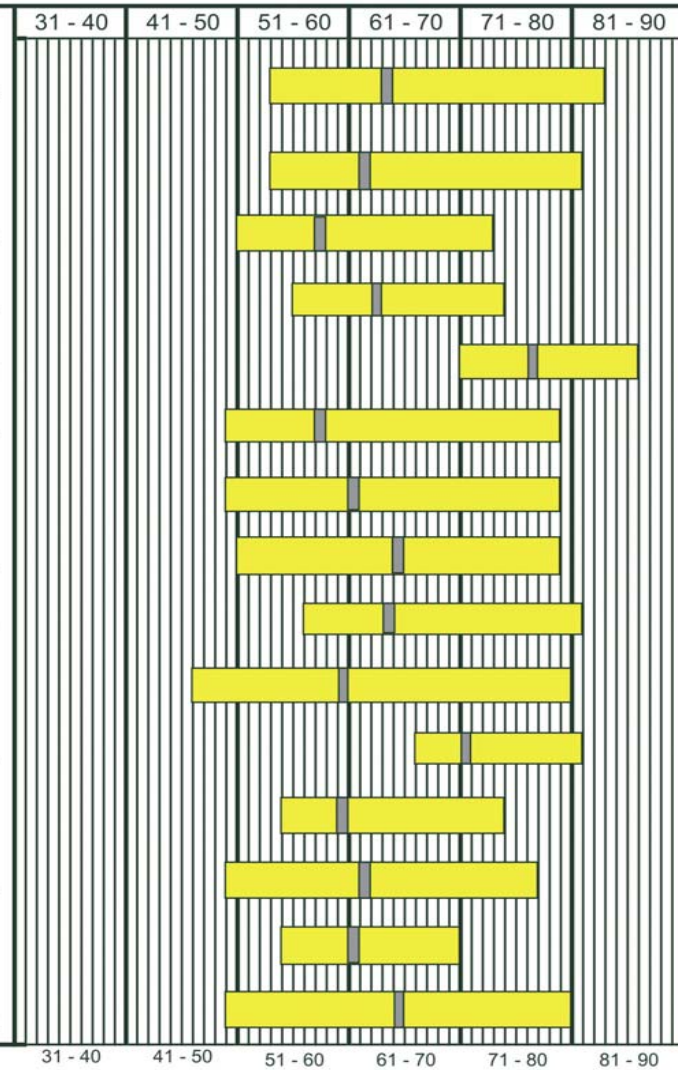
2.4 Existing Noise Contours

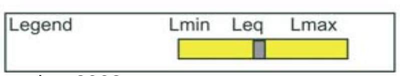
In addition to the noise survey, noise contour maps were produced for the planning area. A noise contour map shows as closed lines those linear bands subject to similar noise levels. Noise is at the highest level near the source and decreases with distance from the source.

TABLE 4
Existing Measured Noise Levels

Site	Location	Date	Start Time	Noise Sources
1	Southeast corner of Commercial Ave. and Logan Ave; across from Orange Line	7/8/08	10:30 a.m.	traffic and trolley
2	1680 Logan Avenue	6/18/08	9:40 a.m.	traffic
3	Perkins Elementary School	7/8/08	10:55 a.m.	traffic
4	Cesar Chavez Parkway	6/10/08	7:57 a.m.	traffic
5	Interstate 5 at Evans St.	6/18/08	9:15 a.m.	traffic
6	900 Block Sampson	6/10/08	8:15 a.m.	traffic
7	2240 National Avenue	6/10/08	7:25 a.m.	traffic
8	2200 Block Newton Street	6/10/08	7:25 a.m.	generator
9	Harbor Drive and across from Blue Line and north of Sampson Street	6/10/08	7:00 a.m.	traffic, trolley
10	2644 Boston Avenue	6/10/08	8:47 a.m.	traffic
11	Across from recycling facility on Boston Avenue	7/8/08	12:12 p.m.	recycling facility
12	2925 Boston Avenue	6/10/08	9:14 a.m.	traffic
13	3038 Main Street	6/10/08	10:41 a.m.	traffic
14	Southeast corner of Vesta St. and Dalbergia St.	6/10/08	9:46 a.m.	traffic
15	3660 Main Street	6/10/08	10:06 a.m.	traffic

Sound Level





2.4.1 Existing Roadway Noise Contours

The existing noise level contours in the planning area are depicted in *Figure 3*. The noise levels in these maps are expressed in terms of the CNEL. With the exception of the noise contours associated with I-5, the noise contours along roadways represent the predicted noise level and do not reflect the mitigating effects of noise barriers, structures, topography, or dense vegetation. Because intervening structures, topography, and dense vegetation may significantly affect noise exposure at a particular location, the noise contours should not be considered site-specific, but rather are guides to determine when detailed acoustic analysis should be undertaken. A theoretical nominal adjustment of five dBA associated with intervening buildings or topography was utilized when depicting the noise contours associated with I-5. SR-75 was modeled as a road on a structure (i.e., bridge). The distances to various traffic CNEL noise contours for the roads used to develop *Figure 3* are depicted in *Attachment B.*

2.4.2 Existing Railway Noise Contours

Railway noise includes noise from the trains and emergency signaling devices. Freight trains and light rail transit (trolley) can generate high, relatively brief, intermittent noise events. Trolley vehicles are equipped with horns, whistles and bells for use in emergency situations and as a general audible warning to track workers and trespassers within the right-of-way as well as to pedestrians and motor vehicles at road grade crossings. Horns, whistles and bells on the moving trolley vehicle, and horns from freight trains, combined with stationary bells at grade crossings can generate excessive noise levels that can effect noise sensitive land uses.

Within the Barrio Logan community the San Diego Metropolitan Transit System (SDMTS) provides trolley service along railway alignments designated the “Blue Line” and “Orange Line”. The San Diego & Imperial Valley Railroad (SDIY) railroad operates at night along the Blue line track. The Burlington Northern Santa Fe (BNSF) operates freight trains on separate tracks. The Blue Line trolley generally is located parallel to the east side of Harbor Drive. The Orange Line trolley is located on Imperial Avenue at the boundary of the community. The freight railway line is located several hundred feet west of Harbor Drive, between the northern boundary of the Barrio Logan community and approximately Schley Street. South of Schley Street the freight railway line is located west of Harbor Drive. There are six at-grade road crossings that the Blue Line trolley traverses and four at-grade crossings the freight trains pass through within the Barrio Logan community. At each of these at-grade crossings there are train warning signals operating while the train is in the vicinity of the crossing. Also, the trolley and freight locomotives use their warning horns and whistles before entering the at-grade road crossings. Warning signals are used at one at-grade road crossings along the orange line adjacent to the Barrio Logan community.

Figure 3 Existing Transportation Noise Contours

The majority of the trolley trains run between the hours of 5:00 a.m. and 10:00 p.m. The Blue Line trolley operations consist of 204 scheduled trains each weekday with fewer trolleys on weekends (SDMTS 2008). Of this total, 140 trains occur during the daytime hours (i.e., 7 a.m. to 7 p.m.) 19 occurring during the evening hours (i.e., 7 p.m. to 10 p.m.) and 45 occur during the nighttime hours (i.e., 10 p.m. to 7 a.m.). The Orange Line trolley operations consist of 141 scheduled trains each weekday with fewer trolleys on weekends (SDMTS 2008). Of this total, 96 trains occur during the daytime hours (i.e., 7 a.m. to 7 p.m.) 17 occurring during the evening hours (i.e., 7 p.m. to 10 p.m.) and 28 occur during the nighttime hours (i.e., 10 p.m. to 7 a.m.).

The BNSF operates a total of approximately four to six freight trains daily through the project area (BNSF 2008). Freight trains vary in length and in the number of locomotives or cars in each operation. Freight train operations are not on a set time schedule; however, the majority of the trains operate at night (BNSF 2008). For the purposes of this study, it is assumed that two freight trains run between the hours of 7:00 a.m. and 7:00 p.m., one freight train between 7:00 p.m. and 10:00 p.m. and three freight trains operate between 10:00 p.m. and 7:00 a.m. Also, the SDIY operates one round-trip freight train six days per week during the night on the Blue Line (SDIY 2008).

Existing trolley train noise was determined based on conducting noise measurements at the project site during several train pass-bys and noise modeling. At a distance of 40 feet to the closest track, the measured maximum noise level varied from 71 dBA to 80 dBA for the trolley trains.

The modeled railway noise levels indicate that the existing noise level at the site ranges up to approximately 61 dBA CNEL at 50 feet associated with the trolley (without the use of a trolley whistle and 63 dBA CNEL at 50 feet with the use of trolley whistles). The BNSF freight trains generate a noise level of approximately 73 dBA CNEL at 50 feet without the use of locomotive horns and 80 dBA CNEL at 50 feet with the use of locomotive horns. The SDIY freight trains generate a noise level of approximately 71 dBA CNEL at 50 feet without the use of locomotive horns and 78 dBA CNEL at 50 feet with the use of locomotive horns. The distances to various trolley and train CNEL noise contours used to develop *Figure 4* are depicted in *Attachment C*.

Existing Stationary Noise Sources

As previously indicated in Section 2.2 the Barrio Logan community is subject to various stationary noise sources including manufacturing and warehousing activities, shipbuilding and repair facilities, recycling facilities, auto repair, other industrial, public service facility uses and commercial uses and Port of San Diego related activities. These noise sources can be continuous and may contain tonal components or impact noise that may be annoying to people would live in the nearby vicinity. In addition, noise levels may vary during the day based on the specific activity being performed, mechanical equipment work load, atmospheric conditions as well as other factors.

The following section is a general discussion of potential noise impacts associated with various stationary noise sources within the Barrio Logan community. Noise levels at these facilities can vary greatly because there can be periods of intense activity levels followed by periods without or moderate levels of activity. It should be noted that determining the typical hourly average noise levels or CNEL noise levels for stationary noise sources is difficult as there are significant variations in the size and operation of equipment used, the activities may not occur continuously during any given hour and the various operations may not occur simultaneously. Also, the background traffic noise generally exceeds the stationary noise at areas in relative close proximity to the primary roads. Therefore, the noise level data discussed below is general and has been collected from field measurements within and outside the Barrio Logan community and does would necessarily reflect the actual noise levels associated with a specific stationary source facility.

Port of San Diego

Current Port of San Diego operations adjacent to the Barrio Logan community primarily consist of ship building and repair yards, and truck distribution activities. Noise associated with these activities includes various types of outdoor mechanical equipment, warning horns and truck deliveries. The noise level associated with these activities will vary. Measured maximum noise levels associated with the ship building and repair ranged up to 65 dB at a distance of 500 feet from the ship yards. Delivery trucks produce a maximum noise level of approximately 75 to 85 dB at a distance of 50 feet depending in part on the speed of the truck. The truck back-up alarms typically generate 65 to 75 dB at 50 feet.

Recycling Facilities

Typical noise sources associated with the operation of recycling facilities include trucks, loaders, conveyor systems, sorting equipment, compactors, fans, blowers and other related equipment. Measured noise levels outside open facilities indicate that maximum noise levels can range between 65 and 80 dB at a distance of 50 feet with hourly average noise levels ranging between approximately 60 and 70 dB.

Automotive Repair and Service

There are several auto repair and service facilities within the Barrio Logan community. Noise associated with automobile repair and service shops includes the pneumatic impact wrenches, hammering, air compressors, closing vehicle doors and hoods, and revving engines. For a shop with an open garage door the maximum noise levels can range from approximately 60 to 80 dB at a distance of approximately 50 feet.

Manufacturing Facilities

There a variety of manufacturing facilities and machine shops in the area that produce items such as boat and ship motor blades, engine parts, sheet metal fabrication, and other types of manufactured components. These facilities are located within shops throughout the community. Mechanical equipment at these facilities includes compressors, generators, welders, manual and pneumatic tools, air-conditioning and heating units, and other types of general and specialized equipment. Maximum noise levels associated with this equipment will vary widely from hardly audible to above 80 dB at a distance of 50 feet.

Some manufacturing facilities may contain outdoor storage areas that require the use of forklifts and delivery trucks similar to warehouse uses. Noise from various sources such as opening/closing truck doors, driving along the delivery access road/parking lot, loading and unloading materials, and operating a fork-lift generate maximum noise levels typically ranging from approximately 60 to 85 dB at 50 feet.

2.5 Existing Conditions Summary

The Barrio Logan community is primarily exposed to noise from roads, railways and stationary noise sources. Traffic noise and railway generate the greatest noise levels and affect the largest number of people. The roads generating the greatest noise level in the area are I-5, SR 75, Harbor Drive, 28th Street and 32nd Street. Rail noise is also a source of noise in the community particularly at and within the vicinity of the railroad crossings where horns and crossing bells are sounded. Noise from trucks driving within or parked and idling along various major and secondary roads in the community can also be a source of annoyance to residents in the community. Stationary noise sources from commercial and industrial activities are highly localized. However, noise from the ship building and repair yards is audible within many areas of the community.

3.0 NOISE GUIDELINES EVALUATION

The Barrio Logan community has not been addressed in detail by any area-wide noise planning studies. Although the City of San Diego's Noise Element of the General Plan applies to the entire City, including the Barrio Logan/Harbor 101 Community, land use in Barrio Logan has been governed by the 1978 Barrio Logan/Harbor 101 Community Plan and Local Coastal Program, and the Barrio Logan Planned District Ordinance (PDO).

The 1978 Barrio Logan/Harbor 101 Community Plan and PDO permit multiple land uses to co-locate throughout the community, which has contributed to noise incompatibilities between adjacent land uses (i.e. single-family residences and heavy industrial development).

The following provides an evaluation of both the City of San Diego's Noise Element of the General Plan (Section 3.1) and 1978 Barrio Logan/Harbor 101 Community Plan and PDO (Section 3.2), followed by Section 3.3 with recommendations for refinements to the Barrio Logan/Harbor 101 Community Plan, necessary to establish consistency with current practices and regulations for noise assessment.

3.1 City of San Diego - General Plan Noise Element

This section provides a summary of Dudek's review of the City of San Diego General Plan Noise Element (NE), dated March 2008. As noted above, the City of San Diego's Noise Element is applicable to the entire City, including the Barrio Logan/Harbor 101 Community.

The purpose of the Noise Element is "To protect people living and working in the City of San Diego from excessive noise". The introduction section of the noise element provides a general discussion of environmental noise, noise sources, noise scales, and regulations, with a listing of "common indoor and outdoor noise levels" and "related regulations and plans used to implement the noise element".

Following the introduction, specific topics are addressed in the Noise Element's Sections A through I, including their Goal, a Discussion, and related Policies. The following provides a summary of these topics.

> Section A.
> This section presents guidelines used by the city to evaluate the land use noise compatibility for proposed new developments, with the goal to "Consider existing and future noise levels when making land use planning decisions to minimize people's exposure to excessive noise."

The city's land use noise compatibility guidelines appear to be similar as the State of California land use noise compatibility guidelines for new developments.

The land use noise compatibility guidelines in the noise element consider noise sensitive land uses, including single and multi-family residences, to be "compatible" if exterior noise levels do not exceed 60 CNEL. The "compatible" land use data require that standard construction methods will be sufficient to attenuate exterior noise to an acceptable indoor noise levels.

Noise sensitive land uses exposed to exterior noise levels ranging between 60 and 65 CNEL are considered "conditionally compatible", provided interior noise levels will not exceed 45 CNEL. Land uses that fall into the "conditionally compatible" noise category require the preparation of an acoustical study. The acoustical study should include an analysis of components listed in the noise element.

For land uses found "incompatible", new construction should generally not be undertaken. Due to severe noise interference, outdoor activities are unacceptable and for structures, extensive mitigation techniques are required to make the indoor environment acceptable.

The City's policies in the Noise Element related to land use noise compatibility can be summarized as follows:

1. Separate excessive noise-generating uses from residential and other noise-sensitive land uses with a sufficient spatial buffer of less sensitive uses.

2. Assure the appropriateness of proposed developments relative to existing and future noise levels by consulting the guidelines for noise-compatible land use to minimize the effects on noise-sensitive land uses.

3. Limit future residential and other noise-sensitive land uses in areas exposed to high levels of noise.

4. Require an acoustical study consistent with Acoustical Study Guidelines for proposed developments in areas where the existing or future noise level exceeds, or would exceed, the "compatible" Land Use - Noise Compatibility Guidelines noise level thresholds, so that noise mitigation measures can be included in the project design to meet the noise guidelines.

5. Prepare noise studies to address existing and future noise levels from noise sources that are specific to a community when updating community plans.

   Sections B, C, and D in the noise element include goals, discussions, and policies for respectively Motor Vehicle Traffic Noise, Trolley and Train Noise, and Aircraft Noise.

   Section E in the noise element includes the goal, a discussion, and policies for Commercial and Mixed-Use Activity Noise.

   Section F in the noise element includes the goal, a discussion, and policies for Industrial Activity Noise.

   Section G in the noise element includes the goal, a discussion, and policies for Construction, Refuse Vehicles, Parking Lot Sweepers, and Public Activity Noise.

   Section H in the noise element includes the goal, a discussion, and policies for Event Noise.

   Section I in the noise element includes the goal, a discussion, and policies for Typical Noise Attenuation Methods.

It can be anticipated that the policies in the city's Noise Element would adequately protect people living and working in the City of San Diego from excessive noise, provided these policies are correctly, and consistently, implemented and applied to all existing and proposed land uses throughout the city, including the Barrio Logan/Harbor 101 Community.

3.2 Barrio Logan/Harbor 101 Community Plan and PDO

Land use in Barrio Logan is governed by the 1978 Barrio Logan/Harbor 101 Community Plan and Local Coastal Program, and the Barrio Logan Planned District Ordinance (PDO). The 1978 Barrio Logan/Harbor 101 Community Plan and PDO permit multiple land uses to co-locate throughout the community, which has contributed to noise incompatibilities between adjacent land uses (i.e. single-family residences and heavy industrial development).

The Barrio Logan Community Plan states:

- Due to the large number of heavy industry and major commercial uses in the plan area, industrially generated noise is a major noise source for the community.

- The chief industries contributing to the industrial noise component are a power generation plant, four major shipbuilding and repair facilities, numerous auto, and heavy metal salvage yards and aluminum can recycle center.
- Adverse impacts from traffic and industry noise levels from would be significantly reduced through Plan proposals.
  - The Plan identifies separate traffic routes for automobiles and large and small trucks that would separate excessively loud traffic from residential land uses.
  - Specific routes between freeways and industrial areas are identified in the Plan for use by large trucks.
  - Alternative transportation modes are provided by the Plan including bicycles, fixed-rail guide way, bus, and recreational transit.
- Industrial sources of noise would be controlled through Plan proposals to consolidate industrial uses into industrial parks.
  - Application of M-IP and M-IB zoning in these parks carries the requirement that loud, unnecessary or unusual noise which endangers health, peace or safety of others may not emanate beyond the boundaries of the industrial park.
  - A separation of industrial and residential uses would reduce noise by increasing the distance between noise sources and sensitive uses.
  - Architectural buffers are proposed along Harbor Drive to achieve further noise reductions from industrial use west of Harbor Drive. Mounding of earth and landscaping are suggested for noise reduction along I-5 where feasible.

3.3 Proposed Refinements to Existing Guidelines

The following refinements to the Barrio Logan/Harbor 101 Community Plan are recommended to establish consistency with current practices and regulations for noise assessment:

Implement and enforce the city's Noise Element land use noise compatibility for new developments, i.e.:

1. Separate excessive noise-generating uses from residential and other noise-sensitive land uses with a sufficient spatial buffer of less sensitive uses.
2. Assure the appropriateness of proposed developments relative to existing and future noise levels by consulting the guidelines for noise-compatible land use to minimize the effects on noise-sensitive land uses.
3. Limit future residential and other noise-sensitive land uses in areas exposed to high levels of noise.
4. Require an acoustical study consistent with Acoustical Study Guidelines for proposed developments in areas where the existing or future noise level exceeds, or would

exceed, the "compatible" Land Use - Noise Compatibility Guidelines noise level thresholds, so that noise mitigation measures can be included in the project design to meet the noise guidelines.

5. Prepare noise studies to address existing and future noise levels from noise sources that are specific to a community when updating community plans.

REFERENCES

Federal Transit Administration, May 2006. *Transit Noise and Vibration Impact Assessment*.

Kimley-Horn and Associates, July 1, 2008. *Email from Marc Mizuta, Barrio Logan Existing ADT*.

Kimley-Horn and Associates, October 2008. *Barrio Logan Mobility Movement*.

City of San Diego, March 2008. *City of San Diego General Plan Noise Element*.

City of San Diego, 2008. *City of San Diego Municipal Code Chapter 5 (Noise Abatement and Control Ordinance).*

San Diego Association of Governments, November 30, 2007. *Final 2030 San Diego Regional Transportation Plan (Chapter 6).*

San Diego & Imperial Valley Railroad, October 10, 2008. *E-Mail Correspondence from Mr. Pete Jespersen.*

San Diego Metropolitan Transit System, January 29, 2008. *Trolley Blue Line and Orange Line Timetables*.

ATTACHMENT A

Acoustical Terms & Definitions

ATTACHMENT A
Acoustical Terms and Definitions

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighting filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise.
Background Noise	The total of all noise in a system or situation, independent of the presence of the noise source of interest (i.e., without the noise of interest).
Community Noise Equivalent Level, CNEL	CNEL is the average equivalent A-weighted sound level during a 24-hour day. CNEL accounts for the increased noise sensitivity during the nighttime (10 PM to 7 AM) and evening (7 PM to 10 PM) by adding ten dB to the sound levels at night and five dB to the sound levels during the evening.
Decibel, dB	A unit for measuring sound pressure level and is equal to 10 times the logarithm to the base 10 of the ratio of the measured sound pressure squared to a reference pressure, which is 20 micropascals.
Equivalent Continuous Sound Level, L_{eq}	The sound level corresponding to a steady state sound level containing the same total energy as a time varying signal over a given sample period. Leq is designed to average all of the loud and quiet sound levels occurring over a time period.
L_x Statistical Descriptors (x= 1-99; e.g., L_1, L_{10}, L_{50})	The sound level exceeded x percent of a specific time period. L_{10} is the level exceeded 10% of the time; L_{50} is the level exceeded 50% of the time
Maximum A-weighted Sound Level, L_{max}	The greatest sound level measured on a sound level meter during a designated time interval or event.

ATTACHMENT B

Vehicle Noise Contour Data

ATTACHMENT B
Vehicle Noise Contour Data

Road (Segment)	ADT	Vehicle Mix Percentage			Speed	CNEL	Distance to CNEL Noise Contour (In feet from center line of road)		
		Auto	Medium Trucks	Heavy Trucks	mph	@ 50'	70	65	60
I-5									
North of SR 75	166,000	95%	2.5%	2.5%	65	85	530	1,145	2,470
SR 75 to 28th Street	162,000	95%	2.5%	2.5%	65	85	525	1,125	2,430
28th Street to I-15	157,000	95%	2.5%	2.5%	65	85	510	1,105	2,380
South of I-15	199,000	95%	2.5%	2.5%	65	86	600	1,295	2,785
SR 75									
West of I-5	73,000	97%	2.3%	0.7%	65	69	R/W	95	210
Cesar Chavez Parkway									
North of Logan Ave.	10,781	96.5%	3%	0.5%	30	64	R/W	R/W	85
Logan Ave. and National Ave.	15,300	96.5%	3%	0.5%	30	65	R/W	50	110
National Ave. and Newton Ave.	12,494	96.5%	3%	0.5%	30	64	R/W	R/W	95
Newton Ave. and Main St.	13,248	96.5%	3%	0.5%	30	64	R/W	R/W	100
Main St. and Harbor Dr.	10,381	96.5%	3%	0.5%	30	63	R/W	R/W	85
Sampson Street									
I-5 and National Ave.	3,086	96.5%	3%	0.5%	30	58	R/W	R/W	R/W
National Ave. and Harbor Dr.	2,561	96.5%	3%	0.5%	30	57	R/W	R/W	R/W
26th Street									
National Ave. and Harbor Dr.	2,380	96.5%	3%	0.5%	30	57	R/W	R/W	R/W
28th Street									
I-5 and Main St.	18,856	92%	4%	4%	35	69	R/W	100	210
Main St. and Harbor Dr.	16,658	92%	4%	4%	35	69	R/W	90	195
32nd Street									
I-5 and Wabash Blvd.	13,172	92%	4%	4%	35	68	R/W	75	165
Rigel Street									
Dalbergia St. and I-5	1,723	96.5%	3%	0.5%	30	56	R/W	R/W	R/W
Vesta Street									
Dalbergia St. and I-5	4,900	96.5%	3%	0.5%	30	60	R/W	R/W	50
Logan Avenue									
17th St. and Sigsbee St.	3,659	92%	4%	4%	35	62	R/W	R/W	70

ATTACHMENT B
Vehicle Noise Contour Data

Road (Segment)	ADT	Vehicle Mix Percentage			Speed	CNEL	Distance to CNEL Noise Contour (In feet from center line of road)		
Sigsbee St. and Cesar Chavez Pkwy	7,478	92%	4%	4%	35	65	R/W	55	115
Cesar Chavez Pkwy and Sampson St.	2,954	92%	4%	4%	35	61	R/W	R/W	60
National Avenue									
16th St. and Sigsbee St.	2,603	96.5%	3%	0.5%	30	57	R/W	R/W	R/W
Sigsbee St. and Beardsley St.	4,500	96.5%	3%	0.5%	30	60	R/W	R/W	50
Beardsley St. and Cesar Chavez Pkwy	3,511	96.5%	3%	0.5%	30	59	R/W	R/W	R/W
Cesar Chavez Pkwy and Evans St.	4,330	96.5%	3%	0.5%	30	60	R/W	R/W	45
Evans St. and Sicard St.	3,677	96.5%	3%	0.5%	30	59	R/W	R/W	R/W
Sicard St. and 27th St.	8,445	96.5%	3%	0.5%	30	62	R/W	R/W	75
Boston Avenue									
29th St. and 30th St.	2,420	96.5%	3%	0.5%	30	57	R/W	R/W	R/W
Main Street									
Beardsley St. to Cesar Chavez Pkwy	1,641	92%	4%	4%	35	59	R/W	R/W	R/W
Cesar Chvez Pkwy and 26th St.	2,598	92%	4%	4%	35	61	R/W	R/W	56
26th St. and 27th St.	7,425	92%	4%	4%	35	65	R/W	50	115
27th St. and 32nd St.	11,266	92%	4%	4%	35	67	R/W	70	150
32nd St. and Rigel St.	21,100	92%	4%	4%	35	70	R/W	105	225
Rigel St. and Siva St.	15,944	92%	4%	4%	35	69	R/W	85	190
Dalbergia St. and I-5 SB Off Ramp	15,177	92%	4%	4%	35	68	R/W	85	180
Harbor Drive									
Beardsley St. to Cesar Chavez Pkwy	12,094	92%	4%	4%	40	69	R/W	90	190
Cesar Chvez Pkwy and Sampson St.	13,778	92%	4%	4%	40	69	R/W	95	210
Sampson St. and SchleySt.	9,080	92%	4%	4%	40	67	R/W	75	160
Schley St. and 28th St.	8,816	92%	4%	4%	40	67	R/W	70	155

Notes:

Noise contour distances do not include the shielding effects of buildings, walls, berms, etc.

R/W = Within right-of-way

ATTACHMENT C

Railroad Noise Contour Data

ATTACHMENT C
Railroad Noise Contour Data

Railway	Train and Trolley Daily Passbys			Distance to CNEL Noise Contour (In feet from nearest track)		
No Grade Crossings (Without Horns/Whistles Scenario)	Day	Evening	Night	70	65	60
Blue Line Trolley	140	19	45	R/W	R/W	60
Blue Line SD&IY	0	0	2	60	190	580
Blue Line Combined	140	19	47	60	190	580
Orange Line Trolley	96	17	28	R/W	R/W	50
BNSF Freight Trains	2	1	3	105	330	1,050
At-Grade Crossing (With Horns/Whistles Scenario)						
Blue Line Trolley	140	19	45	R/W	R/W	95
Blue Line SD&IY	0	0	2	170	370	860
Blue Line Combined	140	19	47	170	370	860
Orange Line	96	17	28	R/W	R/W	75
BNSF Freight Trains	2	1	3	250	555	1,400

Notes:
R/W = Within right-of-way, typically 50 feet or less

ATTACHMENT D

Noise Monitoring Data

ATTACHMENT D
Noise Monitoring Data

Site	Description	Date Time	Vehicles			L_{eq} (dB)	L_{max} (dB)	L_{min} (dB)	L_{1} (dB)	L_{10} (dB)	L_{50} (dB)	L_{90} (dB)
			Cars	MT	HT							
1	Southeast corner of Commercial Avenue and Logan Ave.; 10 feet to Commercial curb; Across from Orange Line	7/8/08 10:30 a.m. to 10:45 a.m.	14/19	0/0	1/0	64	83	54	78	63	58	56
2	1680 Logan Avenue; 13 feet to curb	6/18/08 9:40 a.m. to 9:55 a.m.	41	6	3	62	81	54	78	70	59	56
3	Perkins Elementary School along Newton St.	7/8/08 10:55 a.m. to 11:10 a.m.	6	0	0	58	73	51	69	59	55	52
4	Cesar Chavez Parkway; 12 feet to curb	6/10/08 7:57 a.m. to 8:12 a.m.	154	9	0	63	74	56	70	66	61	58
5	I-5; at right-of-way115' to center line	6/18/08 9:15 a.m. to 9:30 a.m.				77	86	71	82	79	77	74
6	900 block Sampson St.; 10 feet to curb	6/10/08 8:15 a.m. to 8:30 a.m.	26	2	0	58	79	50	68	60	55	53
7	2240 National Ave.; 14 feet to curb	6/10/08 7:57 a.m. to 8:12 a.m.	51	3	1	61	79	50	73	63	55	52
8	Newton Street; 10 feet to curb Primary noise from nearby generator at industrial site	6/10/08 7:25 a.m. to 7:40 a.m.	10	0	1	65	79	51	70	65	65	64
9	140 Feet to center line of Harbor Drive; 40 feet to Blue Line	6/10/08 7:00 a.m. to 7:15 a.m.	116	4	10	64	81	57	77	66	60	58
10	2644 Boston Ave.; 10 feet to curb	6/10/08 8:47 a.m. to 9:02 a.m.	12	0	2	60	80	47	76	57	52	50

ATTACHMENT D
Noise Monitoring Data

Site	Description	Date Time	Vehicles			L_{eq} (dB)	L_{max} (dB)	L_{min} (dB)	L_1 (dB)	L_{10} (dB)	L_{50} (dB)	L_{90} (dB)
			Cars	MT	HT							
11	Across from recycling facility Primary noise from recycling facility	7/8/08 12:12 p.m. to 12:27 p.m.				71	81	67	78	73	70	68
12	2925 Boston Ave.; 10 feet to curb	6/10/08 9:14 a.m. to 9:29 a.m.	29	2	1	60	74	55	67	62	59	57
13	3038 Main Street; 12 feet to curb	6/10/08 10:41 a.m. to 10:56 a.m.	127	9	4	62	77	50	73	65	58	53
14	Vesta St.; 10 feet to curb and Dalbergia St. 16 feet to curb	6/10/08 9:46 a.m. to 10:01 a.m.	36/6	2/1	0/0	61	70	55	68	64	59	57
15	3660 Main Street; 10 feet to curb	6/10/08 10:06 a.m. to 10:21 a.m.	151	5	5	65	80	50	76	68	61	53

Notes:

Vehicles counted during noise measurement: MT = medium trucks, HT = heavy trucks (i.e., trucks with 3 or more axels)

L_{eq} = Equivalent continuous sound level

L_{max} = Maximum sound level during noise measurement

L_{min} = Minimum sound level during noise measurement

L_1, L_{10}, L_{50}, L_{90} = Sound level exceeded 1%, 10%, 50% and 90% of the time during the noise measurement, respectively.